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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,892	06/26/2003	Takeharu Okuno	03560.003326	4901
5514	7590	12/21/2004	EXAMINER LAVARIAS, ARNEL C	
FITZPATRICK CELLA HARPER & SCINTO 30 ROCKEFELLER PLAZA NEW YORK, NY 10112			ART UNIT 2872	PAPER NUMBER

DATE MAILED: 12/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/603,892

Applicant(s)

OKUNO, TAKEHARU

Examiner

Arnel C. Lavarias

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3 and 5-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3 and 5-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings were received on 10/20/04. These drawings are acceptable.

Response to Amendment

2. The amendments to the specification of the disclosure in the submission filed 10/20/04 are acknowledged and accepted.
3. The amendments to Claims 1, 3, 5 in the submission filed 10/20/04 are acknowledged and accepted. In view of these amendments, the objections to Claims 3-5 in Section 3 of the Office Action dated 7/20/04 is respectfully withdrawn.
4. The cancellation of Claims 2 and 4 in the submission filed 10/20/04 is acknowledged and accepted.
5. The addition of Claims 7-10 in the submission filed 10/20/04 is acknowledged and accepted.

Response to Arguments

6. The Applicant argues that, with respect to newly amended Claim 1, Francis fails to teach or reasonably suggest an optical element as generally recited in Claim 1, the first diffraction grating formed of titanium, or a compound thereof, and the second diffraction grating formed of aluminum. After a review of the Francis reference, the Examiner

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agrees, and respectfully withdraws the rejections of Claims 1-6 in Sections 5-8 of the Office Action dated 7/20/04.

7. Claims 1, 3, 5-10 are now rejected as follows.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claim 3 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 3 recites the limitation that ‘... diffusion coefficient of the material of the first diffraction grating is less than a diffusion coefficient of the material of the second diffusion grating.’ It is noted that the specification of the disclosure fails to adequately disclose that the diffusion coefficient of the material of the first diffraction grating having any particular relationship to the diffusion coefficient of the material of the second diffusion/diffraction (it is believed the Applicant intends ‘diffraction’ in this case) grating. It is further noted that the Applicant has specified a relationship between the diffusion coefficient of the material of the first diffraction grating and the diffusion coefficient of the substrate (See for example Paragraphs 0009-0011 of Applicant’s disclosure).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1, 3, 6, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Francis (U.S. Patent No. 3291871), of record, in view of Fujii et al. (U.S. Patent No. 4330175).

Francis discloses an optical element (See for example Figure 6; col. 3, line 13-col. 4, line 69)) comprising a substrate (See 10 in Figure 6); a first diffraction grating disposed on the substrate and having a period that is shorter than a light wavelength used (See 20 in Figure 6); and a second diffraction grating disposed on the first diffraction grating and having a period that is shorter than the light wavelength used (See 25 in Figure 6), wherein the melting point of a material of the first diffraction grating (See col. 3, lines 47-58, wherein the melting point of platinum is approximately 1768.3 deg. C) is higher than the melting point of a material of the second diffraction grating (See col. 3, lines 47-58, wherein the melting points of copper, silver, and gold are 1084.62 deg. C, 961.78 deg. C, and 1064.18 deg. C, respectively). Francis additionally discloses the material of the first diffraction being a metal, and the material of the second diffraction grating being a metal that is different from the material of the first diffraction grating (See col. 3, lines 47-58); the materials of the first and second diffraction gratings being one of gold, silver, copper, and platinum (See col. 3, lines 47-58); and each grating period that is shorter than

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the light wavelength used falls in a range from at least 30 nm to 200 nm at most (See col. 2, line 64-col. 3, line 5). Francis lacks the first diffraction grating being formed of titanium or a compound thereof, and the second diffraction grating being formed of aluminum. However, titanium, compounds of titanium, and aluminum are well known materials in the art for forming diffraction gratings. For example, Fujii et al. teaches a blazed diffraction grating structure (See for example Figures 1, 3-4, 9-12, 14-16), wherein a diffraction grating may be formed by layers of titanium and aluminum metal (See Figure 11; col. 7, lines 18-38). Further, the titanium metal is utilized to prevent the aluminum metal from mixing with the substrate material (See Figure 11; col. 7, lines 18-38). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first diffraction grating be formed of titanium or a compound thereof, and the second diffraction grating be formed of aluminum, as taught by Fujii et al., in the optical element of Francis, for the purpose of providing high reflectivity of the diffracted light, while preventing intermingling of the various layer materials.

12. Claims 5 and 7, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Francis in view of Fujii et al. as applied to Claim 1 above, and further in view of Perkins et al. (U.S. Patent No. 6288840), of record.

Francis discloses the invention as set forth above in Claim 1, except for a thin film of MgF_2 being disposed between the substrate and the first diffraction grating. However, Perkins et al. teaches a wire grid polarizer for use in the visible spectrum (See for example Figures 6-7), wherein an additional thin film comprising a low refractive index

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material, such as MgF_2 , is deposited between the substrate and the diffraction grating.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a thin film of MgF_2 be disposed between the substrate and the first diffraction grating, as taught by Perkins et al., in the optical element of Francis, for the purpose of optimizing the performance of the wire grid polarizer by shifting or suppressing unwanted resonances out of the wavelength band of operation.

13. Claim 8, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Francis in view of Fujii et al.

Francis in view of Fujii et al. discloses the invention of Claim 1, except for the first diffraction grating being formed of titanium nitride. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first diffraction grating being formed of titanium nitride, since it has been held to be within the ordinary skill of worker in the art to select a known material on the basis of its suitability for the intended use. One would have been motivated to have the first diffraction grating be formed of titanium nitride to take advantage of the ease of etching of titanium nitride for forming the diffraction grating grooves. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327. 65 USPQ 297 (1945).

14. Claim 9, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Francis in view of Fujii et al. as applied to Claim 1 above, and further in view of Borrelli et al. (U.S. Patent No. 6813077).

Francis in view of Fujii et al. discloses the invention as set forth above in Claim 1, except for the optical element comprising a third diffraction grating which is formed of

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titanium, or a compound thereof, disposed on the second diffraction grating. However, disposing multiple diffraction grating layers on top of each other is known in the art. For example, Borrelli et al. teaches a diffractive optical structure (See for example Figure 5), wherein multiple diffractive optical layers are disposed one on top of each other (See 44, 48, 46 in Figure 5). Further titanium or compounds of titanium are well known materials in the art for forming diffraction gratings. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the optical element comprising a third diffraction grating which is formed of titanium, or a compound thereof, disposed on the second diffraction grating, as taught by Borrelli et al., in the optical element of Francis in view of Fujii et al., for the purpose of suppressing unwanted reflections of particular components of the incident light.

15. Claim 10, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Francis in view of Fujii et al. as applied to Claim 1 above, and further in view of Magarill et al. (U.S. Patent No. 6719426).

Francis in view of Fujii et al. discloses the invention as set forth above in Claim 1, except for the optical component further comprising an optical member for protecting the first and second diffraction gratings, which is disposed over the second diffraction grating with a predetermined space. However, Magarill et al. teaches a diffractive optical structure functioning as a polarization beam splitter (See for example Figures 2, 5A-B), wherein the diffractive optical structure (See for example 13a in Figures 5A-B) is disposed on a substrate (See 32 in Figure 5A; 20 in Figure 5B), and further includes an optical component further comprising an optical member for protecting the first and

second diffraction gratings, which is disposed over the second diffraction grating with a predetermined space (See 20 in Figure 5A; 32 in Figure 5B; col. 7, line 59-col. 8, line 29). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the optical component further comprise an optical member for protecting the first and second diffraction gratings, which is disposed over the second diffraction grating with a predetermined space, as taught by Magarill et al., in the optical component of Francis in view of Fujii et al., to provide environmental isolation of the diffractive optical structure and air gap to the surrounding environment.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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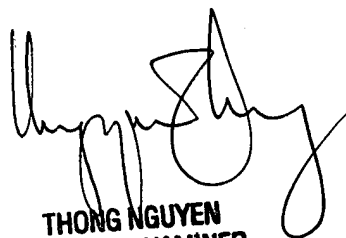
17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 8:30 AM - 5 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Arnel C. Lavarias
12/16/04



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